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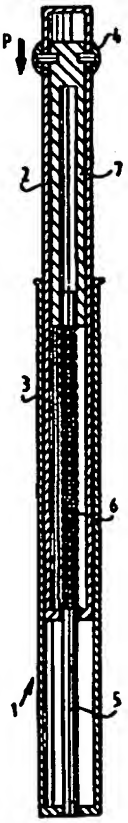
(57) Abstract

The invention relates to a device for coupling to an elongate member (5) at an adjustable position a body displaceable (10) relative to the elongate member, comprising: an elongate member (5), a sleeve-like clamping member (6) manufactured from wire material, and a body (10) displaceable axially relative to the elongate member and having support means for supporting the body (10) on the clamping member close to at least one outer end in axial direction remote from the clamping sleeve. The invention also comprises operating means (25, 26) which engage on at least one outer end of the clamping body for exerting an axial disengaging force directed toward the other outer end.



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MECHANICAL COUPLING CONSTRUCTION

The invention relates to a device for coupling to an elongate member at an adjustable position a body displaceable relative to the elongate member, comprising:
- an elongate member,
- a sleeve-like clamping member manufactured from wire material which is shorter than the elongate member and which is located completely round the elongate member,
- a body displaceable axially relative to the elongate member and having support means for supporting the body on the clamping member close to at least one outer end in axial direction remote from the clamping sleeve, and
- operating means which engage on at least one outer end of the clamping body for exerting on the outer end an axial disengaging force directed toward the other outer end.

Such a coupling device is already known in the prior art. Applications are known in particular for engaging ropes, cables or other flexible elongate members.

The present invention has for its object to provide an improved coupling device of the type stated in the preamble with which the possible applications of the coupling device are increased while retaining the favourable properties of the device known from the prior art. Particularly important herein is the property that only a very limited release force can suffice to release a fastening, even when a great force is being exerted thereon.

The present device provides for this purpose a coupling device as described in the preamble wherein the elongate member is a rigid rod-like member, the displaceable body wholly encloses the clamping member, the operating means are arranged in the displaceable body and biasing means are arranged between the outer ends of the clamping body for pushing apart the outer ends of the

clamping body. The biasing means are preferably integrated into the clamping body.

Due to the steps according to the invention the coupling device can be used in a wide variety of adjustable mechanical constructions instead of only in devices with adjustable rope or cable engagement. By using a rigid rod-like member in combination with a complete enclosure of the clamping member, constructions can be realized with which a very reliable and sturdy coupling can be realized which is nevertheless simple to disengage. The device will be subject to relatively little fouling and also be little susceptible to wear. From an aesthetic viewpoint the device according to the invention also offers great advantages. The clamping member is wholly concealed from view and the rod-like member requires no special modification.

In a preferred embodiment of the invention the rod-like member is connected axially and rigidly to a first profile part at least partially enclosing the displaceable body and the displaceable body comprises a second profile part with a cross-section substantially corresponds in external shape with the shape of the interior of the cross-section of the first profile part. The operating means can herein be fixed to the second profile part at a distance from the clamping member and be connected to the outer end of the clamping member by means of a disengaging member situated on the inside of the second profile part. Using these steps a telescopic rod construction can be obtained, of which the part with smaller cross-section can slide into the part of larger cross-section. Possible applications of this construction are: length-adjustable walking stick, adjustable table and chair legs, stand, height-adjustable suspension construction for instance for a lamp etc.

This preferred embodiment will be elucidated hereinbelow with reference to fig. 1.

In another preferred embodiment of the device the rod-like member is connected axially and rigidly to a

third profile part in line with the rod-like member and the displaceable body comprises a fourth profile part with a cross-section which substantially corresponds in internal shape with the shape of the outside of the cross-section of a third profile part. The operating means can herein be fixed to the fourth profile part at a distance from the clamping member and be connected to the outer end of the clamping member by means of a coupling member situated on the inside of the fourth profile part. By means of these steps a telescopic construction can be obtained wherein a situation is obtained which is precisely the opposite of that described above, i.e the displaceable body is formed by a profile part into which another profile part can slide. The application options as already summarized above are also possible for this telescopic construction. This specific preferred embodiment is however recommended for use in for instance crutches. In the prior art it is the case that the bottom part of a crutch is generally narrower than the top part of the crutch, while for simple operation the operating means of a crutch should properly be situated in the top part of the crutch. For an easier acceptance of a crutch provided with a coupling device according to the invention it is therefore desirable that the crutch be embodied such that the displaceable body of larger cross-section is situated at the top of the construction. These preferred embodiments will be further elucidated with reference to fig. 2 and 3.

The form of the profile parts in both the above stated preferred embodiments can for instance be tubular. Such profile parts are inexpensive, easy to clean and give the telescopic construction a generally accepted appearance.

In yet another preferred embodiment of the invention the rod-like member is connected pivotally to a frame close to the outer end and the body displaceable relative to the rod-like member is connected pivotally to the frame at a distance from the pivot point between rod-like

member and frame so that a relative movement is realized between the rod-like member and displaceable body during pivoting of the rod-like member. The displaceable body herein preferably encloses the rod-like member completely. The operating means preferably comprise an element which is movable relative to the displaceable body and in which the outer end of the rod-like member is received for axial displacement. By means of these steps a construction is obtained wherein a pivotable body can be fixed using devices according to the invention. A very advantageous application here is a hand brake in an automobile. A drawback of the existing hand brake construction is that when it is in the engaged position it can only be disengaged by producing a relatively great force. With a coupling device according to the invention the locking can be released with a relatively very limited force. Such a hand brake is continuously operative whereby an optimum tension can always be applied to the brake. This preferred embodiment is further elucidated with reference to fig. 4a and 4b.

Yet another preferred embodiment of the invention is characterized in that the displaceable body is provided with two support elements, which support elements are located between two engaging elements which are rigidly connected to the outer ends of the clamping member such that the mutual distance between the support elements is less than the distance between the engaging elements. At least one engaging element is preferably provided herein with an operating member connected to the displaceable body. By means of these steps a coupling device can be realized with which the displaceable body is locked in two directions by a single clamping member. A possible application of this preferred construction is a length-adjustable ski pole. In applications of this construction a bilateral locking must anyway be desirable, this being the case with a ski pole in respect of supporting on the pole when a pressure force is exerted on the pole and in respect of pulling the pole out of ice and/or snow,

whereby a tensile force is exerted on the pole. This preferred embodiment will be further elucidated with reference to fig. 5.

As stated above, the present invention will be further elucidated with reference to the non-limitative embodiments shown in the following figures. Herein:

Fig. 1 shows a cross-section through a telescopic construction according to the invention,

Fig. 2 shows a cross-section through an alternative telescopic construction,

Fig. 3 shows a cross-section through the telescopic construction shown in fig. 2 in which a spring is arranged,

Fig. 4a shows a cross-section through a pivotable construction in starting position,

Fig. 4b shows a cross-section through the pivotable construction shown in fig. 4a in partially pivoted position, and

Fig. 5 shows a cross-section through a coupling device with bilateral locking.

Fig. 1 shows a telescopic construction in which an internal tube 2 (also designated second profile part) is displaceable in an external tube 3 and an operating ring 4 is arranged on internal tube 2. By exerting a limited force in the direction according to arrow P the internal tube 2 can be moved downward. In order to move internal tube 2 upward relative to external tube 3 (also designated first profile part), it is not necessary to load the operating ring 4. The construction can be embodied such that the force to be exerted on operating ring 4 to release internal tube 2 relative to external tube 3 can be very limited irrespective of the load being exerted on internal tube 2. Another advantage is that when operating ring 4 is released the telescopic construction 1 is immediately locked again. The internal tube 2 will hereby follow the hand with which the operating ring 4 is operated. Accidental disengaging of telescopic construction 1 is then only possible when operating ring 4 is loaded. As

soon as it is noticed that telescopic construction 1 is released and the user's hand is withdrawn from the operating ring, the telescopic construction 1 is immediately locked again.

A round rod 5 is received in external tube 3 at fixed axial position. Arranged round a part of rod 5 is a clamping sleeve 6 which is formed by a woven wire structure. Clamping sleeve 6 is fixedly connected at the bottom to internal tube 2 and engages at the top onto an operating tube 7 which is situated in the upper part of internal tube 2. On the side of operating tube 7 remote from clamping sleeve 6 the tube engages on operating ring 4. By now exerting a force directed in the direction of arrow P on operating ring 4 the operating tube 7 will be urged downward a limited distance. The upper part of clamping sleeve 6 will hereby also be displaced downward a limited distance. As a consequence the clamping sleeve 6 is compressed over a limited distance and will no longer engage on rod 6. Clamping sleeve 6 is embodied herein such that when operating ring 4 is not loaded the clamping sleeve 6 engages on rod 5 so that telescopic construction 1 is locked. Clamping sleeve 6 can be embodied such that the outer ends move so far apart in non-loaded situation of operating ring 4 that clamping sleeve 6 engages on rod 5, but it is also possible to accommodate a compression spring for instance between the bottom of internal tube 2 and the bottom of operating tube 7. Such a compression spring does however have the drawback that at least the biasing force of the compression spring must be overcome by the force exerted on operating ring 4 when telescopic construction must be released.

Fig. 2 shows a telescopic construction 8 in which the rod 5 on which clamping sleeve 6 engages is axially connected at the bottom to a leg part 9 (also designated third profile part). An external tube 10 (also designated fourth profile part) is displaceable in axial direction relative to leg part 9. The bottom of external tube 10 is rigidly connected to the bottom of clamping sleeve 6. The

top part of clamping sleeve 6 engages on an operating tube 11 situated in the upper part of external tube 10. The top part of operating tube 11 engages on operating ring 4. In contrast to the telescopic construction 1 shown in fig. 1, in the telescopic construction 8 as shown in fig. 2 the external tube 10 engages round clamping sleeve 6. Telescopic construction 8 also only blocks in downward direction. The most significant difference in telescopic construction 8 relative to telescopic construction 1 is that operating ring 4 engages on the part with the largest diameter. Telescopic construction 8 is developed particularly for use in crutches and the like, wherein a length adjustment of the crutch from the top is desired but wherein in accordance with general practice the bottom part has a smaller diameter than the top part.

Fig. 3 shows a telescopic construction 12 which corresponds to a very considerable extent with the telescopic construction 8 as shown in fig. 2. In this telescopic construction however, an additional compression spring 13 is included which supports at the top on the external tube 10 and at the bottom engages on rod 5 (or leg part 9) which takes a hollow form on the top for this purpose. Due to compression spring 13 the telescopic construction 12 will automatically move apart as soon as a downward force is exerted on operating ring 4. A crutch provided with telescopic construction 12 can hereby be extended in very simple manner, while in order to shorten telescopic construction 12 it is necessary after unlocking to exert an axial pressure force on external tube 10 which is greater than the pressure force exerted by compression spring 13. The latter preferably has a comparatively great length in order to obtain a more or less equal spring constant irrespective of whether the telescopic construction 12 is fully extended or fully retracted.

Fig. 4a and 4b show a hand brake construction 14. A frame 15 is provided with two pivot shafts 16,17 to which are connected a housing 18, the hand brake construction

14 and a rod 19 arranged internally in hand brake construction 14. Engaging round a part of rod 19 is a clamping sleeve 20 which on the side closer to pivot shaft 17 engages on a projecting part 21 which is fixedly connected to housing 18. The side of clamping sleeve 20 remote from pivot shaft 17 is received in a hollow control knob 22 which is mounted on housing 18 of hand brake construction 14. When housing 18 is pivoted upward out of the situation shown in fig. 4a the rod 19 will slide to the right relative to the housing and in particular relative to the projecting part 21 of housing 18. Clamping sleeve 20 is herein "compressed" against the projecting part 21 of housing 18. However, when housing 18 must be pivoted downward again out of the situation shown in fig. 4b, the rod 19 will want to slide to the left relative to clamping sleeve 20, and this is hindered by the clamping sleeve. This will anyway engage on the rod 19. In order to pivot the housing 18 downward it is necessary to press on the knob 22, which compresses the clamping sleeve 20 and allows the rod 19 a free passage through clamping sleeve 20. The force with which the knob must be operated can be very limited, which enables a simplified disengagement of a hand brake construction 14.

A possible alternative to this construction is formed by a hand brake construction 14 of which the housing 18 is pivotally connected to the frame 15 but the rod 19 engages by means of a projecting cam in a cam track which is fixedly connected to frame 15. Rod 19 must herein be connected to housing 18 such that it is displaceable in longitudinal direction. When housing 18 is pivoted the displacement of a cam in the cam track will then result in an axial displacement of rod 19 relative to housing 18. An advantage of this construction is that the desired displacement of the rod 19 during pivoting of housing 18 can be precisely defined in the form of a cam track.

Finally, fig. 5 shows a coupling construction 23 in which a clamping sleeve 24 is arranged which engages at

the outer ends on operable fixing elements 25,26. Clamping sleeve 24 is arranged round a rod-like member 27. A tubular housing 28 is also arranged round rod-like member 27. On the inside of tubular housing 28 between fixing elements 25,26 are arranged two support members 29,30 respectively for co-action with fixing elements 25,26. When tubular housing 28 is moved upward relative to rod 27 the support member 13 will support on fixing element 26. The position of tubular housing 28 is then fixed relative to rod 27. A fixation also takes place in downward direction when tubular housing 28 is moved downward. The support member 29 will in any case then support on fixing element 25. It is noted that the coupling construction 23 as shown in this figure requires a little play, which can optionally be taken up with a spring.

In order to release coupling construction 23 a force must be exerted as according to arrow F1 on fixing element 25 or a force F2 exerted on fixing element 26. The coupling construction 23 as shown in fig. 5 thus enables a support of tubular housing 28 on rod 27 which can be blocked bilaterally.

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CLAIMS

1. Device for coupling to an elongate member at an adjustable position a body displaceable relative to the elongate member, comprising:
- an elongate member,
- a sleeve-like clamping member manufactured from wire material which is shorter than the elongate member and which is located completely round the elongate member,
- a body displaceable axially relative to the elongate member and having support means for supporting the body on the clamping member close to at least one outer end in axial direction remote from the clamping sleeve, and
- operating means which engage on at least one outer end of the clamping body for exerting on the outer end an axial disengaging force directed toward the other outer end, wherein the elongate member is a rigid rod-like member, the displaceable body wholly encloses the clamping member, the operating means are arranged in the displaceable body and biasing means are arranged between the outer ends of the clamping body for pushing apart the outer ends of the clamping body.

2. Coupling device as claimed in claim 1, wherein the biasing means are integrated into the clamping body.

3. Coupling device as claimed in claim 1 or 2, wherein the elongate member is connected axially and rigidly to a first profile part at least partially enclosing the displaceable body and the displaceable body comprises a second profile part with a cross-section substantially corresponding in external shape with the shape of the interior of the cross-section through the first profile part.

4. Coupling device as claimed in any of the foregoing claims, wherein the operating means are fixed to the second profile part at a distance from the clamping member and are connected to the outer end of the clamping

member by means of a disengaging member situated on the inside of the second profile part.

5. Coupling device as claimed in claim 1 or 2, wherein the elongate member is connected axially and rigidly to a third profile part located in line with the elongate member and the displaceable body comprises a fourth profile part with a cross-section which substantially corresponds in internal shape with the shape of the outside of the cross-section through the third profile part.

6. Coupling device as claimed in claim 5, wherein the operating means are fixed to the fourth profile part at a distance from the clamping member and are connected to the outer end of the clamping member by means of a coupling member situated on the inside of the fourth profile part.

7. Coupling device as claimed in any of the foregoing claims, wherein the profile parts are tubular.

8. Coupling device as claimed in claim 1 or 2, wherein the elongate member is connected pivotally to a frame close to an outer end and the body displaceable relative to the elongate member is connected pivotally to the frame at a distance from the pivot point between elongate member and frame so that a relative movement is realized between elongate member and displaceable body during pivoting of the elongate member.

9. Coupling device as claimed in claim 8, wherein the displaceable body encloses the elongate member completely.

10. Coupling device as claimed in claim 8 or 9, wherein the operating means comprise an element which is movable relative to the displaceable body and in which an outer end of the elongate member is received for axial displacement.

11. Coupling device as claimed in claim 1 or 2, wherein the elongate member is provided with a cam, which cam engages in a cam track which is fixedly connected to a frame and the body displaceable relative to the elon-

gate member is pivotally connected to the frame so that when the displaceable body is pivoted the cam is displaced in the cam track whereby a relative movement is realized between elongate member and displaceable body.

12. Coupling device as claimed in claim 1 or 2, wherein the displaceable body is provided with two support elements, which support elements are located between two engaging elements which are rigidly connected to the outer ends of the clamping member such that the mutual distance between the support elements is less than the distance between the engaging elements.

13. Coupling device as claimed in claim 11, wherein at least one engaging element is provided with an operating member connected to the displaceable body.

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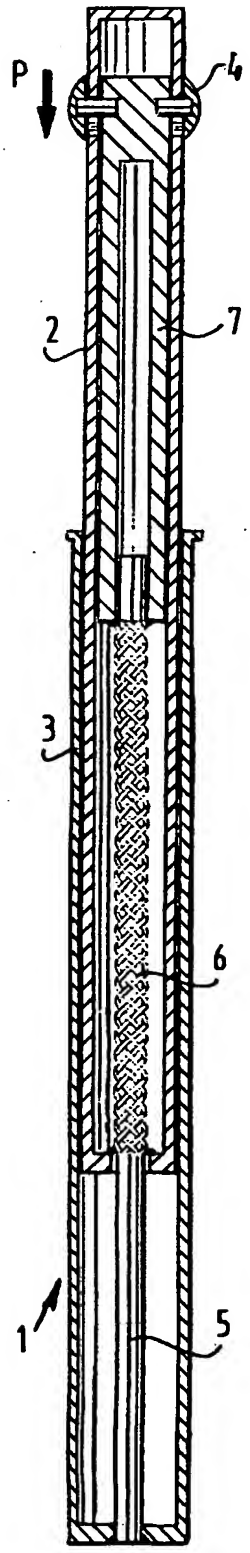

FIG.1

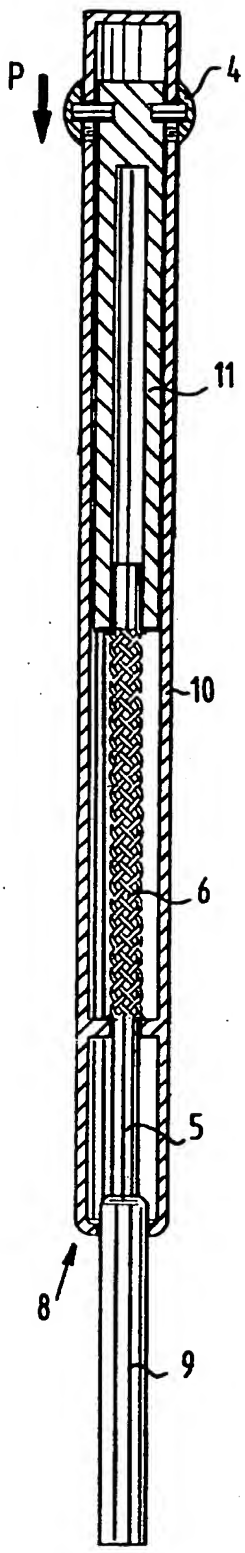

FIG.2

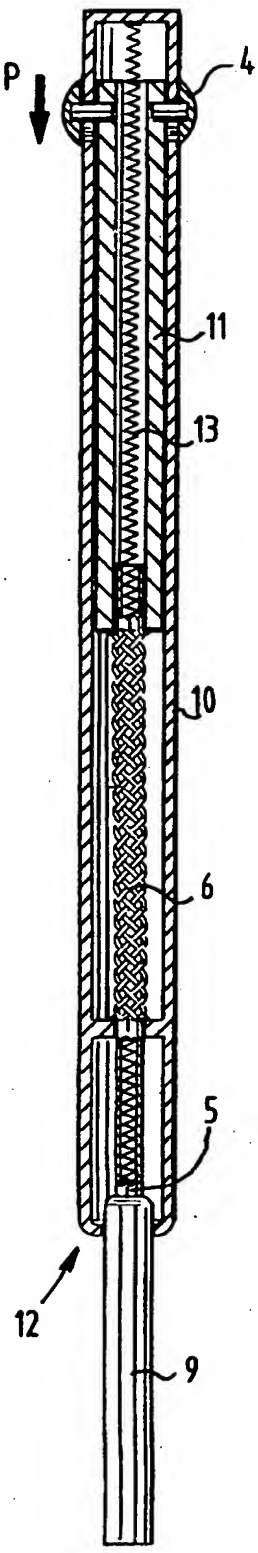

FIG.3

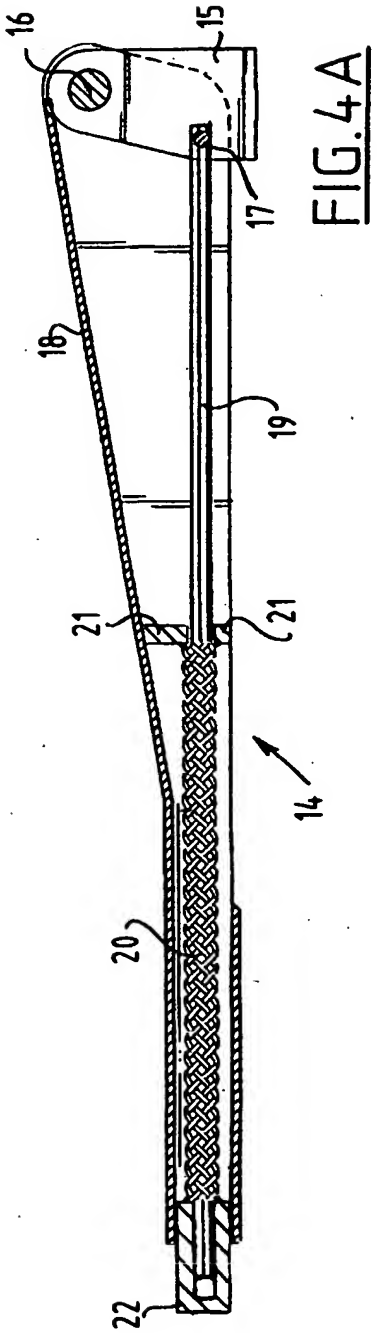

FIG.4A

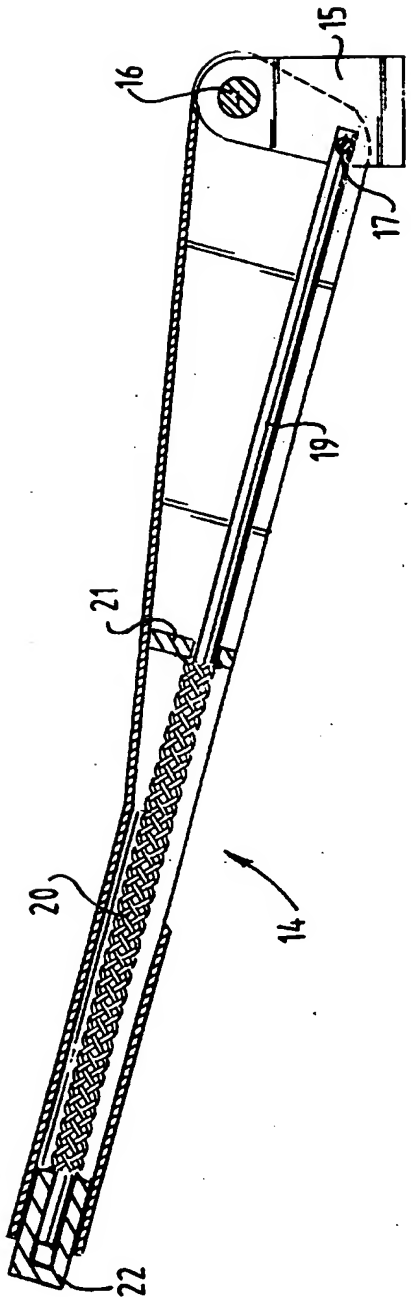

FIG.4B

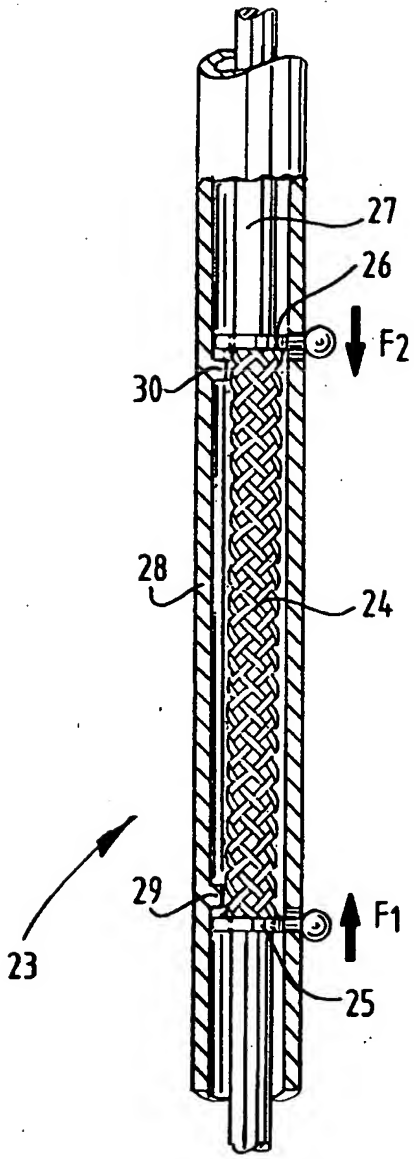

FIG.5

INTERNATIONAL SEARCH REPORT

Int tional Application No
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A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 F16B7/14

According to International Patent Classification(IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 F16B F16G

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No
X	EP 0 062 942 A (PHILIPS NV) 20 October 1982 see abstract; claims; figures	1,2,7
X	DE 17 50 653 A (SEYDEL K) 8 April 1971 see the whole document	1,2
X	US 3 343 231 A (CLAY) 26 September 1967 see the whole document	1,2, 11-13
A	WO 91 02179 A (JANSEN REINDERT JAN) 21 February 1991 see abstract; figures	1,10-13
A	WO 88 06244 A (HUME CATHERINE GILLIES ;MARCH BRIAN GEORGE (GB)) 25 August 1988 see abstract; figures	2

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4 055 875 A (STRICKLAND FREDERICK W) 1 November 1977 see the whole document	8,9

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INTERNATIONAL SEARCH REPORT

Information on patent family members

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